

# **Service Manual**

## **WS SERIES**

**PACKAGE UNITS**

And

**SPLIT SYSTEM**

**WATER SOURCE  
AIR CONDITIONERS  
WITH R410A REFRIGERANT**





# Contents

<b>SAFETY FIRST!</b> .....	4
<b>1. INTRODUCTION</b> .....	5
<b>2. TECHNICAL DATA TABLES</b> .....	8
<b>3. WATER SOURCE CONSOLE UNITS</b> .....	11
<b>4. SPLIT CONDENSER UNITS</b> .....	12
<b>5. HEATING ELEMENT RECOMMENDATIONS</b> .....	13
<b>6. REFRIGERATION CYCLE DIAGRAMS</b> .....	14
<b>7. INSTALLATION INSTRUCTIONS</b> .....	16
<b>8. INSTALLING THE CONTROL SYSTEM AND CONNECTING POWER...</b>	22
<b>9. ELECTRICAL WIRING DIAGRAMS</b> .....	25
<b>10. TROUBLESHOOTING GUIDE</b> .....	31
<b>11. CONTROL PROGRAMS and OPERATION INSTRUCTIONS</b> .....	37

## SAFETY FIRST!



Safe operation is UNIQUE's number-one priority when designing products. Please read all the safety information and the instructions completely prior to beginning the installation and operation of the unit.



UNIQUE products are designed for HVAC use. Using this equipment for any other purpose or in a way not within the operation recommendations specified in this manual will void the warranty and may cause injury. This manual is designed to provide comprehensive installation/operation information for this UNIQUE product. The table of contents provides a convenient overview of the information in this manual.



**Follow Safety Instructions!** Carefully read all safety messages in this manual and on the equipment. Follow recommended practices and safe operating practices. Keep Safety Signs in good condition. Replace missing or damaged Safety Signs.



**Danger!** In planning the location of the equipment, take into consideration any areas that could present an unsafe situation. Avoid power lines that could come into contact with the equipment.



**Warning! – Electrical Safety.** To avoid electrical shock, place equipment in a safe area, use guards around control panels and always shut off and lock out control boxes when working on equipment.

In selecting electrical equipment to be used with the installation, you must use equipment conforming to applicable local or international codes or regulations.



**Important!** Check all equipment for warning, danger and Caution Decals, before equipment is operated.

Do not bypass or take shortcuts with electrical safety equipment. Make sure electrical equipment is properly installed and grounded by a qualified electrician, and that it meets and adheres to all local laws and codes.

Be sure covers, guards and safety devices are correctly installed and in proper position.



**Danger!** Failure to follow proper assembly and operational procedures may cause damage to equipment or personal injury.

## 1. INTRODUCTION

This Service Manual provides comprehensive technical documentation for all models of UNIQUE-WS split and packaged water source air conditioners.

The information contained in the manual is useful for application engineers, architects, system designers, contractors and various level service and installation personnel.

The manual also contains information about the optional features offered by the UNIQUE-WS series, as well as helpful information on electrical wiring diagrams and refrigeration cycle diagrams for the various models.

**Product specifications are subject to change without notice. Appearance of products may differ slightly from manual images.**

### 1.1 Product Overview

Unique-WS air conditioners are operating with water cooled condensing unit and can be utilized in applications such as residential, industrial and commercial buildings, offices, schools and other facilities. The operation of Unique-WS air conditioners is quiet and durable with low maintenance requirements and provides efficient year-round cooling and heating. The units are suitable for cooling tower installations, ground water sources or open water circuits.

Unique-WS air conditioners feature heat pump facilities for heating, utilizing a 4-way reversing valve which switches the unit into heating mode. In heating mode adequate temperature of the cooling water must be insured.

Alternatively, electric heating elements can be used for heating. In such configuration the units are equipped with additional protection elements.

Scope of supply includes package units and split condenser units.

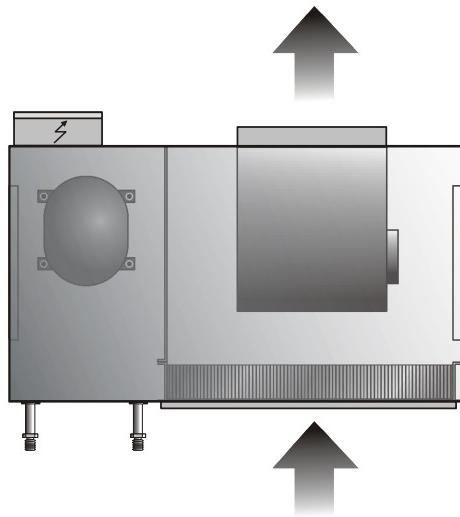
Unique-WS appliances are adequate for ambient temperature range of minimum 19°C and maximum 35°C and water input temperature range of minimum 16°C and maximum 35°C.

All Unique-WS air conditioners are ISO-9001:2000 and CE certified.

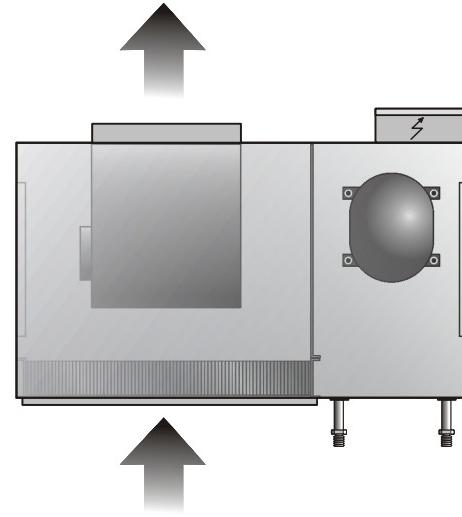


## 1.2 Manufacturing Options

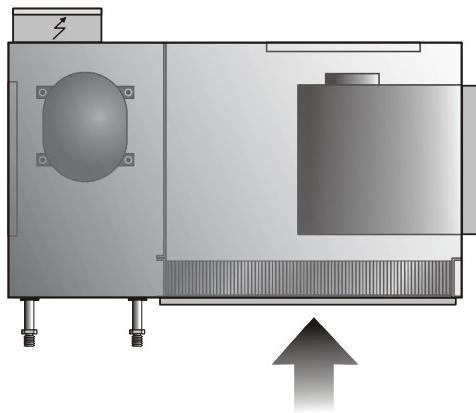
WS air conditioners are available in horizontal or vertical execution. Standard layout includes SL, SR, FL and FR setup. Additional configurations are available upon request.



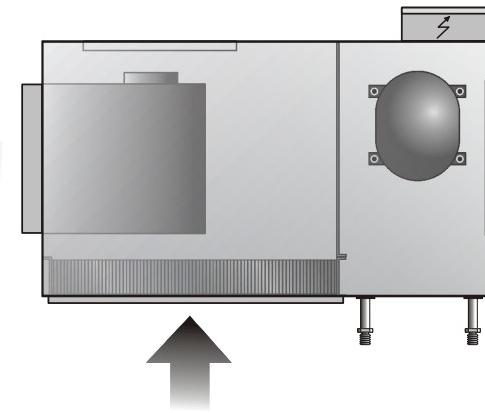
FL



FR



SL



SR

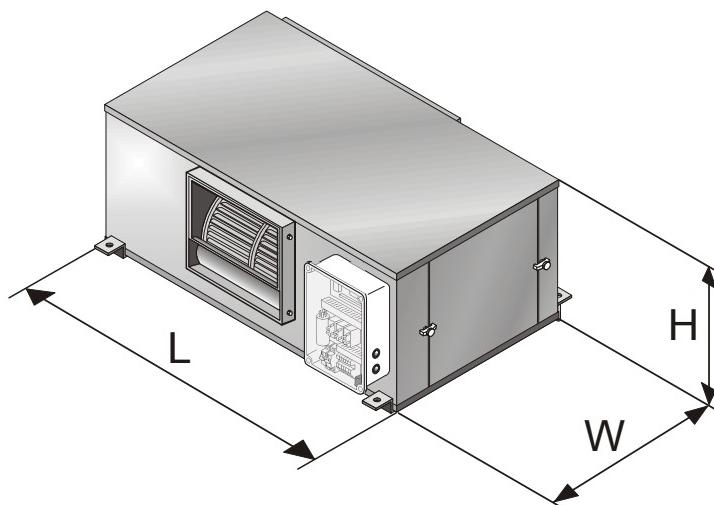
### 1.3 Nameplate Information

Technical information for a specific unit appears on the unit nameplate, which is attached to the indoor and/or the outdoor units.

**The unit nameplate includes the following information:**

MODEL	Air-conditioner model name
CLIMATE CLASS	Class T1 – Standard conditions.
VOLT/PHASE/Hz	A/C power supply, for example: 400/3/50 = 400V/3 Phase/50 Hz.
COS φ	Power factor for the unit.
FUSE	Required fuse size, Amp.
CAPACITORS $\mu$ F	Compressor capacitor, Fan capacitor (wherever applicable)
AIR FLOW m <sup>3</sup> /h	Air Flow at High Speed in m <sup>3</sup> /h
AIR FLOW cfm	Air Flow at High Speed in cfm
WATER FLOW m <sup>3</sup> /h	Water Flow in m <sup>3</sup> /h
WATER FLOW gpm	Water Flow in gpm
REFRIGERANT	Type and Quantity of refrigerant charge, Gr.
CAPACITY W	Cooling capacity in Watts.
CAPACITY BTU/H	Cooling capacity in BTU/Hr.
INPUT POWER	Power consumption in cooling and heating modes, watts.
AMP.	Current consumption in cooling and heating modes, Amp.

## 2.1 Technical Data Table – WS Package Units



Model		WS-12	WS-15	WS-22	WS-28
Cooling capacity <sup>(1)</sup>	Watt	3281	4159	6239	8202
	Btu/h	11200	14200	21300	28000
Heating capacity <sup>(1)</sup>	Watt	4247	5331	7469	9813
	Btu/h	14500	18200	25500	33500
Power Consumption <sup>(2)</sup>	Cooling	Watt	859	1066	1588
	Heating	Watt	1036	1300	1822
Operating Current <sup>(2)</sup>	Cooling	Amp.	6.0	6.6	9.5
	Heating	Amp.	6.0	8.7	12.0
C.O.P.	Cooling		3.82	3.90	3.93
	Heating		4.10	4.10	4.10
Air Flow	M <sup>3</sup> /h	680	850	1190	1530
	CFM	400	500	700	900
Net Static Pressure <sup>(3)</sup>	mm H <sub>2</sub> O	5	2.5	2.5	2.5
Water Flow	M <sup>3</sup> /h	0.6	0.8	1.1	1.5
	GPM	2.6	3.3	4.9	6.5
Heat Rejection-Cooling	Watt	4140	5225	7827	10305
	Btu/h	14133	17839	26721	35180
Heat Extraction-Heating	Watt	3211	4031	5647	7477
	Btu/h	10963	13762	19280	25525
Power Supply	V/Ph/Hz	230/1/50 <sup>(4)</sup>	230/1/50 <sup>(4)</sup>	230/1/50 <sup>(4)</sup>	230/1/50 <sup>(4)</sup>
Time Delay Fuse	Amp.	C10	C10	C16	C20
Water Piping in/out	BSP	3/4"	3/4"	3/4"	1"
Drain	mm	19	19	19	19
Refrigerant Charge	gr.	1100	1100	1200	1300
Dimensions (LxWxH)	mm	880x600x400	880x600x400	960x600x460	1040x600x460
Net Weight	Kg.	67	70	80	94

1. Design data for cooling: Air entering temperature 27°C db/19°C wb and water inlet temperature 29°C  
 Design data for heating: Air entering temperature 21°C and water inlet temperature 20°C

2. Excluding electrical heating element.

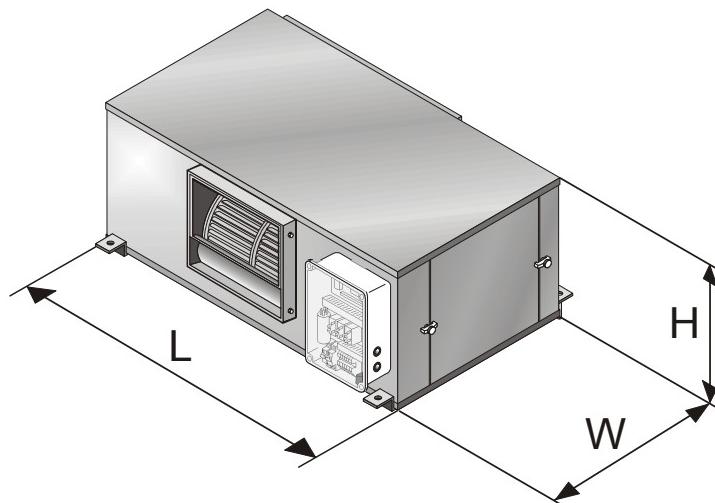
3. Net static pressure available at fan discharge at nominal capacity.

4. Available also in 400/3/50.

Data applicable for R410A. For additional information contact Unique Ltd.

Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

## 2.1 Technical Data Table – WS Package Units (continued)



Model		WS-36	WS-43	WS-48	WS-54	WS-61
Cooling capacity <sup>(1)</sup>	Watt	10516	12449	13679	15700	17428
	Btu/h	35900	42500	46700	53600	59500
Heating capacity <sup>(1)</sup>	Watt	12390	14382	15847	18893	20240
	Btu/h	42300	49100	54100	64500	69100
Power Consumption <sup>(2)</sup>	Cooling	Watt	2689	3259	3553	4015
	Heating	Watt	3098	3508	3865	4608
Operating Current <sup>(2)</sup>	Cooling	Amp	17.7	18.1	3x8.1	3x10.0
	Heating	Amp	13.9	22.3	3x9.7	3x11.7
C.O.P	Cooling		3.91	3.82	3.85	3.91
	Heating		4.00	4.10	4.10	4.00
Air Flow	M <sup>3</sup> /h	2040	2550	2720	3060	3400
	CFM	1200	1500	1600	1800	2000
Net Static Pressure <sup>(3)</sup>	mm H <sub>2</sub> O	3.8	5	5	5	5
Water Flow	M <sup>3</sup> /h	1.9	2.3	2.5	2.8	3.2
	GPM	8.3	9.9	10.9	12.5	13.9
Heat Rejection-Cooling	Watt	13205	15708	17232	19715	21978
	Btu/h	45080	53626	58830	67307	75034
Heat Extraction-Heating	Watt	9292	10874	11982	14285	15180
	Btu/h	31723	37124	40907	48768	51825
Power Supply	V/Ph/Hz	230/1/50 <sup>(4)</sup>	230/1/50 <sup>(4)</sup>	400/3/50	400/3/50	400/3/50
Time Delay Fuse	Amp.	C20	C25	3xC16	3xC16	3xC16
Water Piping in/out	BSP	1"	1"	1"	1"	1"
Drain	mm	19	19	19	22.2	22.2
Refrigerant Charge	gr.	1500	1600	2300	2600	2700
Dimensions (LxWxH)	mm	1090x600x520	1290x600x520	1290x600x560	1370x700x560	1370x700x560
Net Weight	Kg.	108	115	125	137	145

1. Design data for cooling: Air entering temperature 27°C db/19°C wb and water inlet temperature 29°C  
 Design data for heating: Air entering temperature 21°C and water inlet temperature 20°C

2. Excluding electrical heating element.

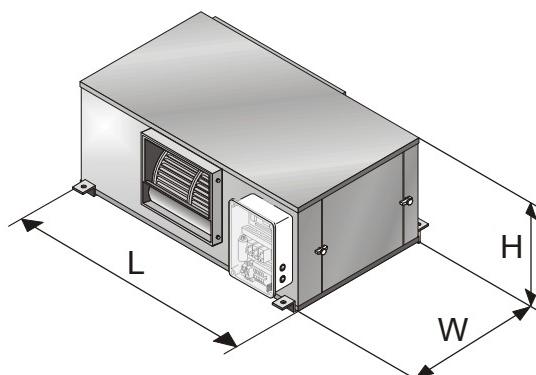
3. Net static pressure available at fan discharge at nominal capacity.

4. Available also in 400/3/50.

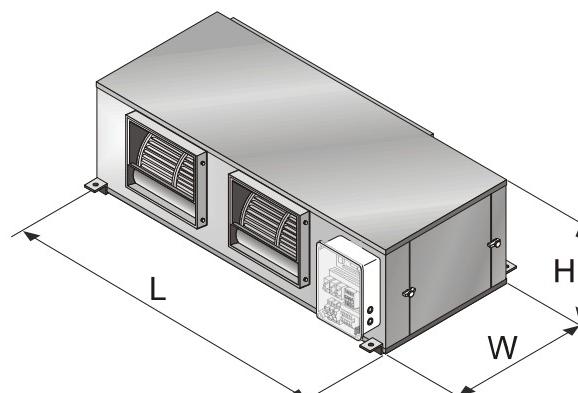
Data applicable for R410A. For additional information contact Unique Ltd.

Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

## 2.1 Technical Data Table – WS Package Units (continued)



WS-75 to WS-102



WS-120 and WS-144

Model			WS-75	WS-85	WS-102	WS-120	WS-144
Cooling capacity <sup>(1)</sup>	Watt	21734	24751	29643	34739	41945	
	Btu/h	74200	84500	101200	118600	143200	
Heating capacity <sup>(1)</sup>	Watt	25395	28910	34974	40715	49502	
	Btu/h	86700	98700	119400	139000	169000	
Power Consumption <sup>(2)</sup>	Cooling	Watt	5573	6314	7601	8862	10646
	Heating	Watt	6194	6883	8743	9930	11786
Operating Current <sup>(2)</sup>	Cooling	Amp	3x14.9	3x16.2	3x18.2	3x22.4	3x31.1
	Heating	Amp	3x16.9	3x18.3	3x21.2	3x26.0	3x35
C.O.P.	Cooling		3.90	3.92	3.90	3.92	3.94
	Heating		4.10	4.20	4.00	4.10	4.20
Air Flow	M <sup>3</sup> /h	4080	4760	5100	6800	8160	
	CFM	2400	2800	3000	4000	4800	
Net Static Pressure <sup>(3)</sup>	mm H <sub>2</sub> O	6.4	6.4	6.4	7.6	8.9	
	M <sup>3</sup> /h	3.9	4.5	5.4	6.3	7.6	
Water Flow	GPM	17.3	19.6	23.5	27.6	33.2	
	M <sup>3</sup> /h	3.9	4.5	5.4	6.3	7.6	
Heat Rejection-Cooling	Watt	27307	31065	37244	43601	52591	
	Btu/h	93226	106056	127150	148855	179545	
Heat Extraction-Heating	Watt	19201	22027	26231	30785	37716	
	Btu/h	65554	75201	89551	105099	128763	
Power Supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Time Delay Fuse	Amp.	3xC20	3xC25	3xC25	3xC40	3xC40	
Water Piping in/out	BSP	1½"	1¼"	1¼"	1½"	1½"	
Drain	mm	22.2	22.2	22.2	30	30	
Refrigerant Charge	gr.	3200	3700	3900	4200	6000	
Dimensions (LxWxH)	mm	1510x700x600	1540x750x610	1650x850x610	2050x1000x630	2050x1100x660	
Net Weight	Kg.	165	185	195	255	325	

1. Design data for cooling: Air entering temperature 27°C db/19°C wb and water inlet temperature 29°C  
Design data for heating: Air entering temperature 21°C and water inlet temperature 20°C

2. Excluding electrical heating element.

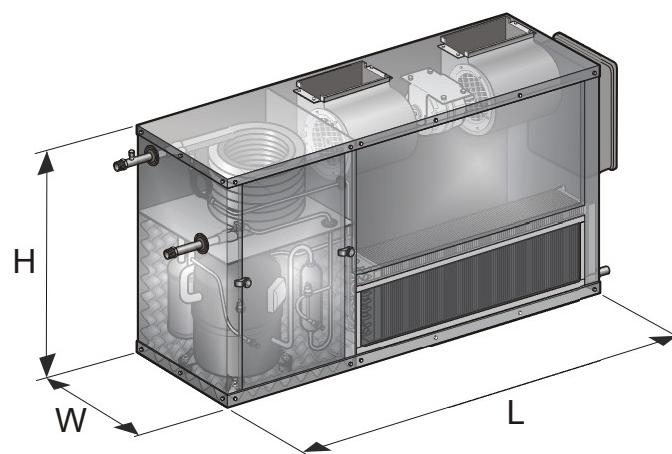
3. Net static pressure available at fan discharge at nominal capacity.

4. Available also in 400/3/50.

Data applicable for R410A. For additional information contact Unique Ltd.

Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

### 3. Technical data table – WSC – Water Source Console



Model			WSC-12	WSC-15	WSC-22	WSC-28
Cooling capacity <sup>(1)</sup>	Watt	3281	4159	6239	8202	
	Btu/h	11200	14200	21300	28000	
Heating capacity <sup>(1)</sup>	Watt	4247	5331	7469	9813	
	Btu/h	14500	18200	25500	33500	
Power Consumption <sup>(2)</sup>	Cooling	Watt	859	1066	1588	2103
	Heating	Watt	1036	1300	1822	2336
Operating Current <sup>(2)</sup>	Cooling	Amp.	6.0	6.6	9.5	13.3
	Heating	Amp.	6.0	8.7	12.0	16.9
C.O.P	Cooling		3.82	3.90	3.93	3.90
	Heating		4.10	4.10	4.10	4.20
Air Flow	M <sup>3</sup> /h		680	850	1190	1530
	CFM		400	500	700	900
Net Static Pressure <sup>(3)</sup>	mm H <sub>2</sub> O		5	2.5	2.5	2.5
	M <sup>3</sup> /h		0.6	0.8	1.1	1.5
Water Flow	GPM		2.6	3.3	4.9	6.5
Heat Rejection-Cooling	Watt		4140	5226	7827	10305
	Btu/h		14133	17839	26721	35180
Heat Extraction-Heating	Watt		3211	4031	5647	7477
	Btu/h		10963	13762	19280	25525
Power Supply	V/Ph/Hz		230/1/50 <sup>(4)</sup>	230/1/50 <sup>(4)</sup>	230/1/50 <sup>(4)</sup>	230/1/50 <sup>(4)</sup>
Time Delay Fuse	Amp.		C10	C10	C16	C20
Water Piping in/out	BSP		3/4"	3/4"	3/4"	1"
Drain	mm		19	19	19	19
Refrigerant Charge	gr.		1100	1100	1200	1300
Dimensions (LxWxH)	mm		1100x350x700	1100x350x700	1350x350x700	1350x350x700
Net Weight	Kg.		62	65	75	75

1. Design data for cooling: Air entering temperature 27°C db/19°C wb and water inlet temperature 29°C  
Design data for heating: Air entering temperature 21°C and water inlet temperature 20°C

2. Excluding electrical heating element.

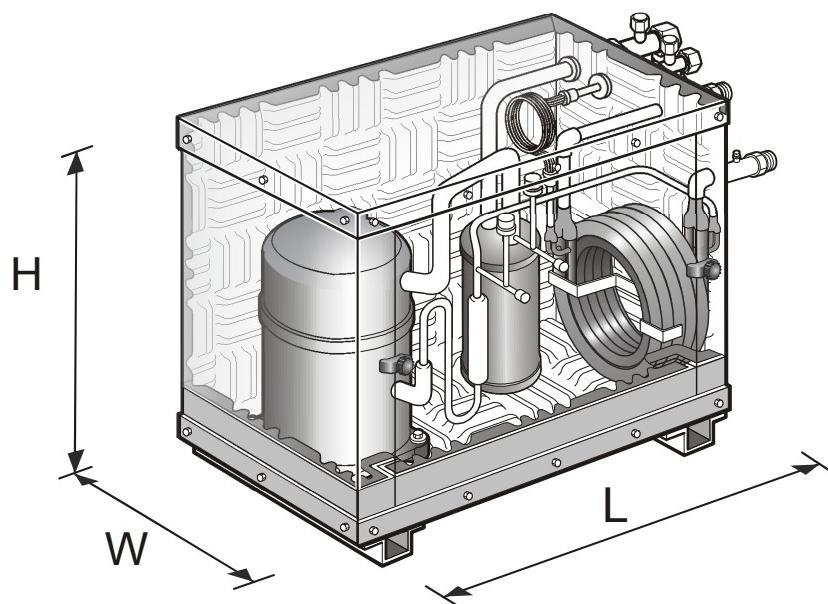
3. Net static pressure available at fan discharge at nominal capacity.

4. Available also in 400/3/50.

Data applicable for R410A. For additional information contact Unique Ltd.

Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

#### 4. Dimensions and Weights – Split Condenser Units



Model	LxWxH	Refrigerant Tubing Connections		Water Inlet	Weight
	mm	Liquid (Small) inch	Suction (Large) inch		
WS-12	600x350x400	3/8"	1/2"	3/4"	35
WS-15	600x350x400	3/8"	1/2"	3/4"	38
WS-22	600x350x400	3/8"	5/8"	3/4"	45
WS-28	600x350x420	3/8"	5/8"	1"	61
WS-36	600x400x460	3/8"	5/8"	1"	68
WS-43	650x450x520	1/2"	3/4"	1"	68
WS-48	650x450x520	1/2"	3/4"	1"	70
WS-54	650x450x520	1/2"	3/4"	1"	71
WS-61	750x480x560	1/2"	7/8"	1"	73
WS-75	750x480x560	1/2"	7/8"	1 1/4"	75
WS-85	750x550x610	1/2"	7/8"	1 1/4"	95
WS-102	750x550x610	1/2"	7/8"	1 1/4"	100
WS-120	850x550x630	5/8"	1 1/8"	1 1/2"	135
WS-144	1000x550x630	5/8"	1 1/8"	1 1/2"	150

Data applicable for R410A. For additional information contact Unique Ltd.

Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

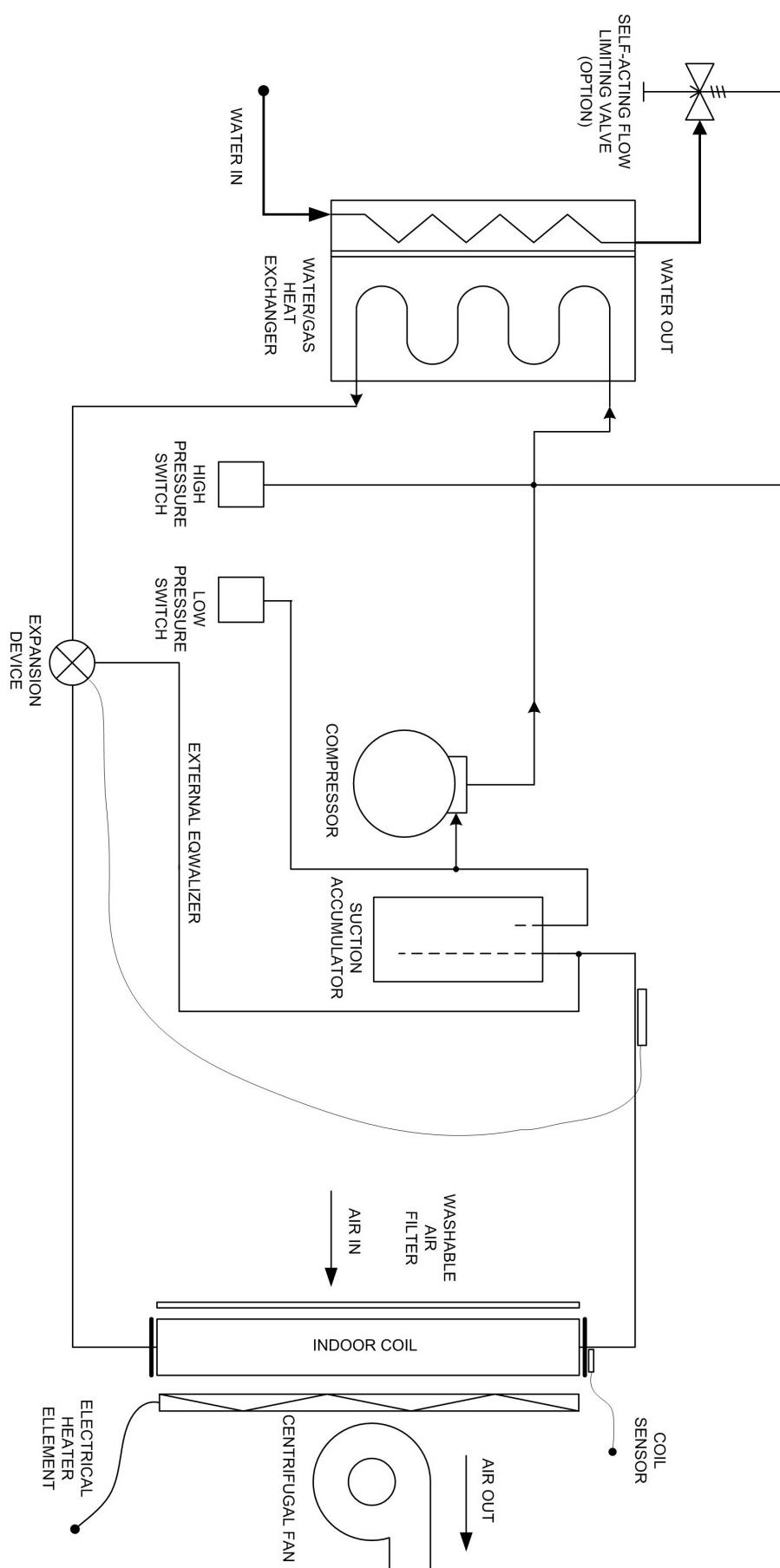
## 5. Heating Element Recommendations

Model	Heating Element Kw	1-Ph Units		3-Ph Units	
		Current Amp.	Fuse Amp.	Current Amp.	Fuse Amp.
WS-12	1.5	6.8	10	3x2.2	3x6
WS-15	2	9.1	10	3x3.1	3x6
WS-22	3	13.7	16	3x4.6	3x6
WS-28	4	18.2	20	3x6.1	3x10
WS-36	5	22.8	25	3x7.6	3x10
WS-43	6	27.3	32	3x9.1	3x16
WS-48	6	-	-	3x9.1	3x16
WS-54	8	-	-	3x12.2	3x16
WS-61	9	-	-	3x13.7	3x16
WS-75	9	-	-	3x13.7	3x16
WS-85	10	-	-	3x15.2	3x20
WS-102	12	-	-	3x18.2	3x20
WS-120	14	-	-	3x20.3	3x25
WS-144	17	-	-	3x26	3x32

Data applicable for R410A. For additional information contact Unique Ltd.  
Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

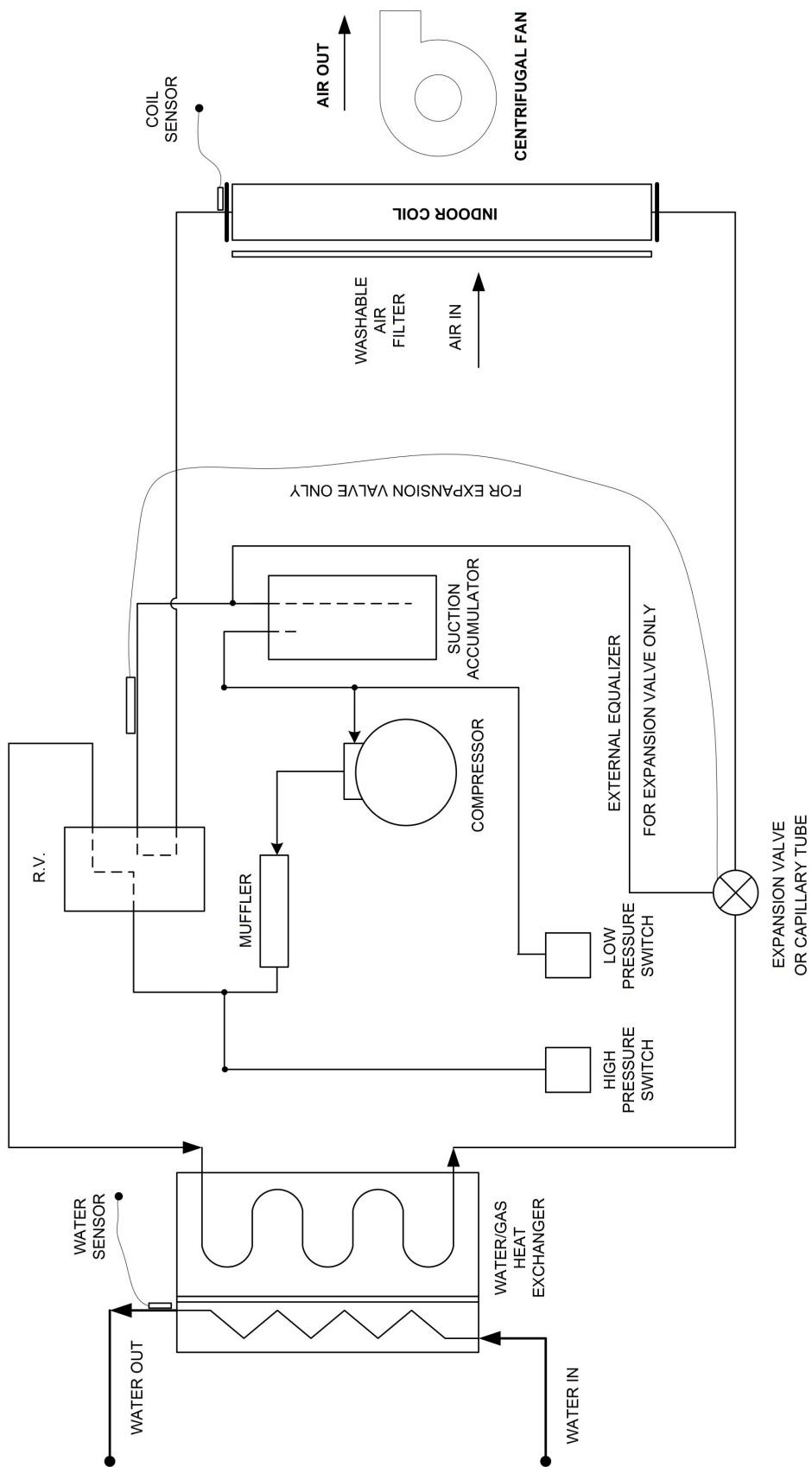
## 6.1 Refrigeration Cycle – Cooling Only

W/S REFRIGERATION CYCLE - COOLING ONLY



## 6.2 Refrigeration Cycle – Heat Pump

WS REFRIGERATION CYCLE - HEAT PUMP



## 7. INSTALATION INSTRUCTIONS

### 7.1 General

All parts and accessories are packed and shipped with appropriate measure to ensure that everything is protected during transportation.

The installation team must be familiar with the installation requirements, to exercise due care in handling and to prevent damage to the equipment.

The following instructions are in addition to any state and municipal regulations which may apply. These instructions do not cover all features concerning HVAC installation or methods of procedure.

The appliance shall be installed in accordance with the national wiring regulations.

The installation must be performed in accordance with manufacturer's specifications using only approved piping, original cables and original accessories.



**Note:** The appliance is classified as a stationary class I motor-operated appliance.

### 7.2 Electrical Requirements

- The appliance is stationary and shall be connected to the electrical supply by fixed wiring.
- The air conditioner must be directly connected to an appropriate power supply.
- Use only fuses as specified in the data tables.
- Use only a single length power cable, without extensions.
- If the supply cord is damaged, it must be replaced by a qualified electrician and in accordance with national wiring regulations.
- Cable and conduit entries shall be suitable for cables or conduits having maximum overall diameters of 14 mm and 16 mm (23 mm in USA and Canada), respectively. Introduction of conduit or cable does not reduce clearances below 2 mm for basic supplementary insulation and 2 mm for functional insulation.
- Supply cord shall not be lighter than each of the following (a lower number in the code designation of the cord in IEC 60227 or IEC 60245 indicates a lighter type):
  - a. Ordinary tough rubber sheathed cord (code designation 60245 IEC 53)
  - b. Light polyvinyl chloride sheathed cord (code designation 60227 IEC 53)
- Nominal cross-sectional area for conductors of supply cord (cable for fixed wiring) shall be 2.5-6 mm<sup>2</sup>.
- Supply cord shall not be in contact with sharp points or edges of the appliance.
- The supply cord shall have a green/yellow core that is connected to the earthing terminal of the appliance and to the earth contact of the outlet.
- Conductors of supply cords shall not be consolidated by lead-tin soldering where they are subjected to contact pressure, unless the clamping means is constructed so that there is no risk of bad contact due to cold flow of the solder.
- Mounting the cord to part of the enclosure shall not damage the insulation of the supply cord.
- Chord anchorages shall be arranged so that they are only accessible with the aid of a tool or shall be constructed so that the cord can only be fitted with the aid of a tool.
- The insulated conductors of the supply cord shall be additionally insulated from accessible metal parts by basic insulation. This insulation may be provided by the sheath of the supply cord or by other means.

- The arrangement of the terminals, or the length of the conductors between the cord anchorage and the terminals, shall be such that the current carrying conductors become taut before the earth conductor if the cord slips out of the cord anchorage.
- Conditional connection to power network provides not more than 0.09 ohm of power system impedance.



**Important!** Means for disconnecting from the supply mains, having a contact separation in all poles that provide full disconnection under overvoltage category III, shall be incorporated in the fixed wiring and directly connected to the supply terminals, in accordance with the wiring rules.



**Important!** Means for disconnection from supply mains must be incorporated in the fixed wiring in accordance with the national wiring regulations.



**Important!** The control wires between the main control box and the wall mounted thermostat utilize low voltage 12V DC.

The supply (mains) cable and control wire (flat cable between the wall mounted thermostat Alfa 261 and electrical box) shall be passed in separate (different) ducts and not in proximity to each other.



**Note:** Main circuit breaker and power supply must always be ON in models that their compressor is equipped with oil heating element.

If disconnected, make sure that power supply was ON for at least 6 hours before starting the unit.



**Note:** The appliance is suitable for indoor use only.



**Warning!** Failure to comply with these instructions may cause malfunction of the unit.



**Important!** In case where an electrical valve for entering or exiting cooling water is being used - verify that valve is open before the compressor starts.

### 7.3 Typical WS Installation

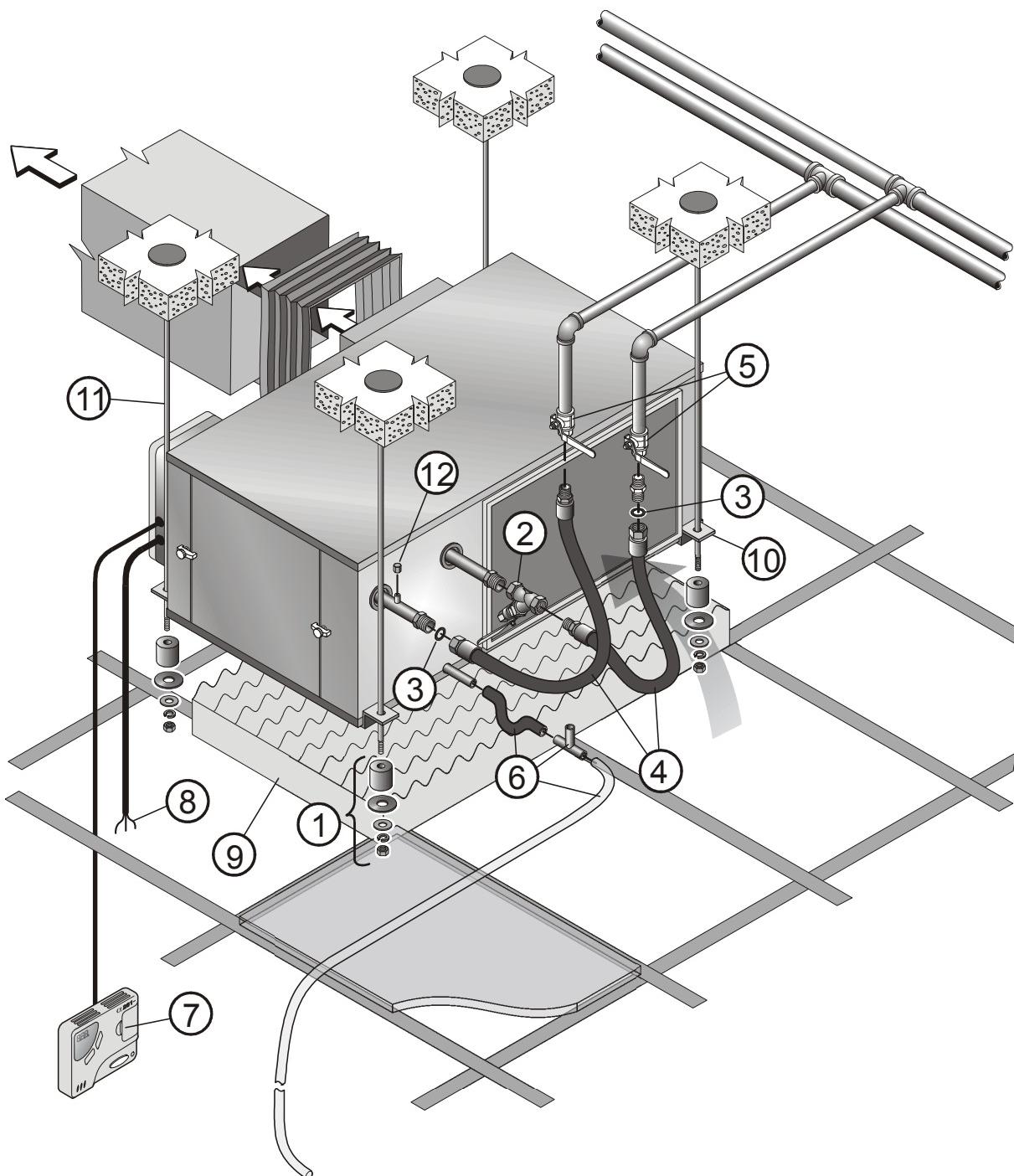


Fig. 7-1

- 1. Rubber Shock Absorbers.
- 2. Strainer.
- 3. PTFE or Rubber ring.
- 4. Flexible hose.
- 5. Cut-Off Valves.
- 6. Rubber Joints (Siphon, T-Connection and Drain Hose).
- 7. Control Unit.
- 8. Electrical cable.
- 9. Acoustic Insulation.
- 10. Hanger Mounting Brackets.
- 11. Hanger Anchors.
- 12. Air Vent Plug.

## 7.4 Unit Location and Installation

- Install the unit in a location with convenient access to the service panels, air filter and control box. See Fig. 7-2 for minimum permissible distances to adjacent structures.
- Protect the unit from any heat source.
- Make sure that the unit is level.
- For all models, hanging installation is commonly used. Installing the unit resting on a rigid surface is allowed.
- Carefully plan the drainage hose path at a minimum slope of 2%, avoiding sharp bends or water traps.

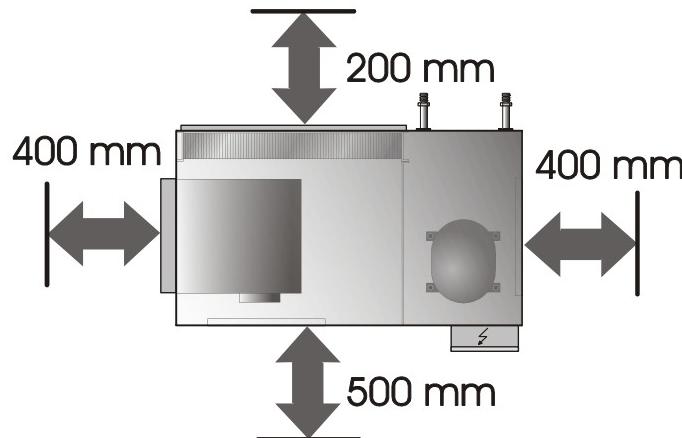


Fig. 7-2

### 7.4.1 Installing the Unit Directly On the Ceiling (Fig. 7-1)

- Select the installation location according to the above mentioned considerations and guidelines.
- Mark 4 holes on the ceiling, according to the unit's mounting bracket holes (10).
- Drill adequate holes and fix the long ceiling anchors (11) in position.
- Lift up the unit onto the hanger anchors through the mounting brackets. Insert four rubber shock absorbers on the four anchors, as shown in Fig. 7-1. Lock the assembly with the lock nut.
- Should the unit be installed on a rigid surface, stick four rubber absorption cushions on the four corners of the base.
- In any mode of installation it is recommended to place under the unit an acoustic insulation sheet (9).

## 7.5 Connecting the Water Piping

- Clearly identify the water supply piping.
- An external safeguard device shall be connected to the water source to limit its output pressure (in excess of atmospheric pressure) to 6 bar.
- Use flexible hoses (4) to connect the water piping according to Fig. 7-3. For piping size see technical data tables. Use only premium quality flexible hoses and make sure it withstands the system water pressure. (Note: Ample pressure hoses must be installed in tall buildings.)

- Connect the incoming water to the WATER IN connection and the return water to the WATER OUT connection. Use adequate thread sealant and also the supplied sealing ring (3).
- The supplied strainer (2) must be installed on the WATER IN connection. See Fig. 7-1. Install the strainer with the drain plug facing down, in a location with convenient service access.
- Complete the water piping installation and open the two cut-off valves (5). Allow water to flow in and out the unit.
- Carefully open the air vent plug (12). Release all air from the system and close the plug back.
- Inspect all connections for water leaks. It is common practice to leave open the two cut-off valves (5) throughout the rest of the installation and occasionally inspect the piping for leaks.

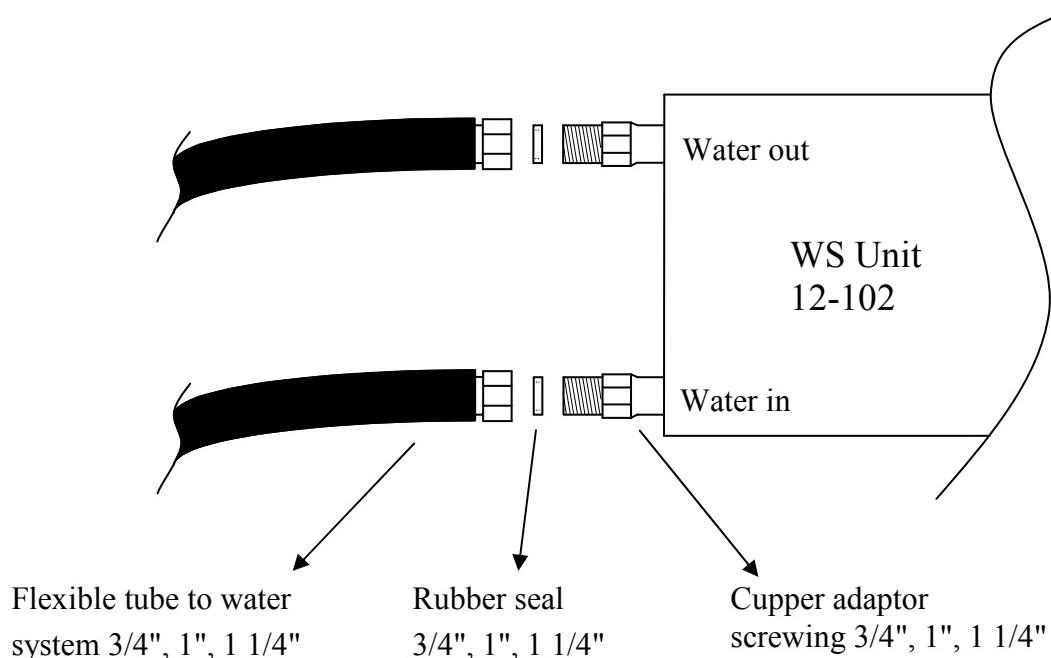
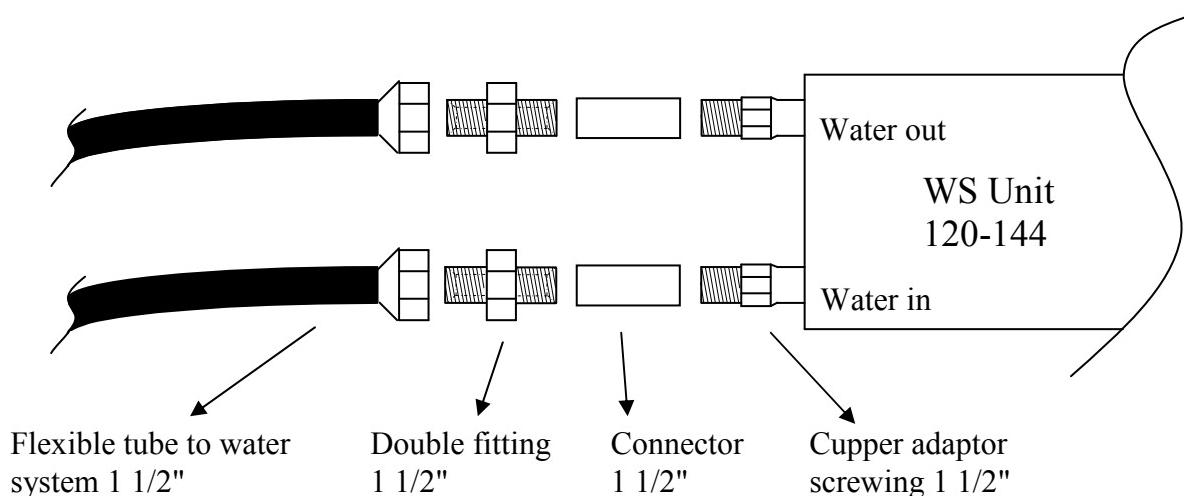


Fig. 7-3

## 7.6 Connecting the Drain Hose

Connect the supplied rubber siphon (6) to the drain hose connection. See Fig. 7-1 for details. The T- connection (breather, not supplied) and the drain hose (not supplied) immediately follow the siphon.

## 7.7 Connecting the Ducting Work

- To obtain optimal results, duct cross sections, connections, elbows and branches must be properly designed. We highly recommend seeking for expert advice on this matter.
- Use flexible sleeve to connect the ducting to the air conditioner.

## 7.8 Connecting the Temperature Sensor Bulbs

- See Fig. 7-4 for identification.
- The temperature sensor bulbs are factory pre-assembled.
- In case of replacement, make sure that the new bulb is fitted into the locating tube with touch-fit.

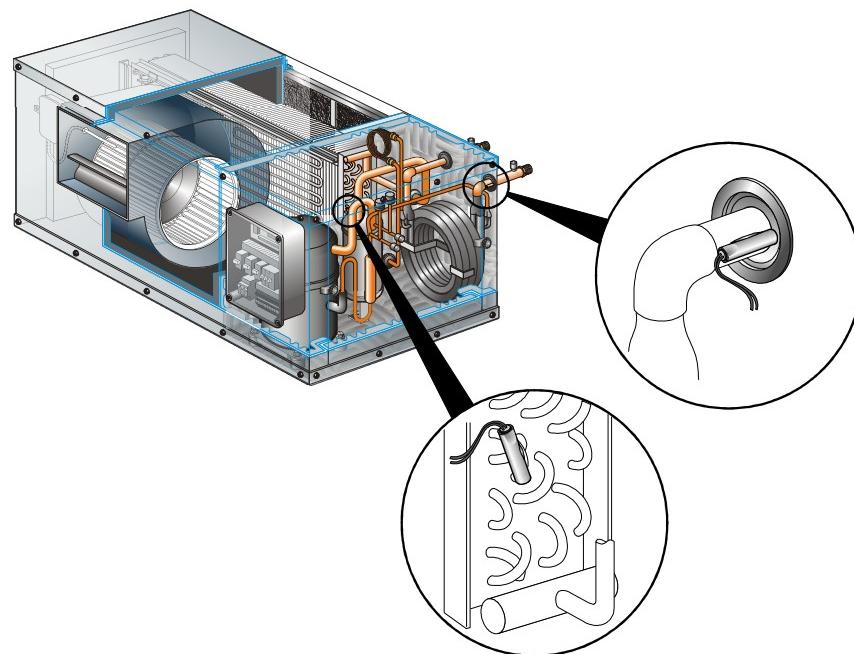
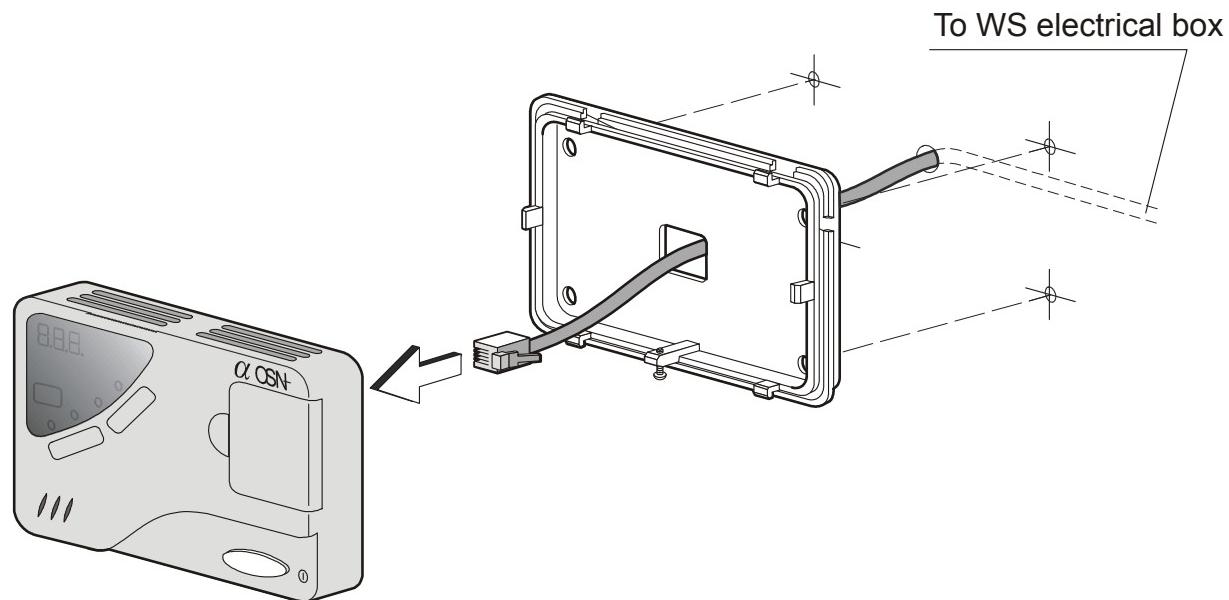


Fig. 7-4

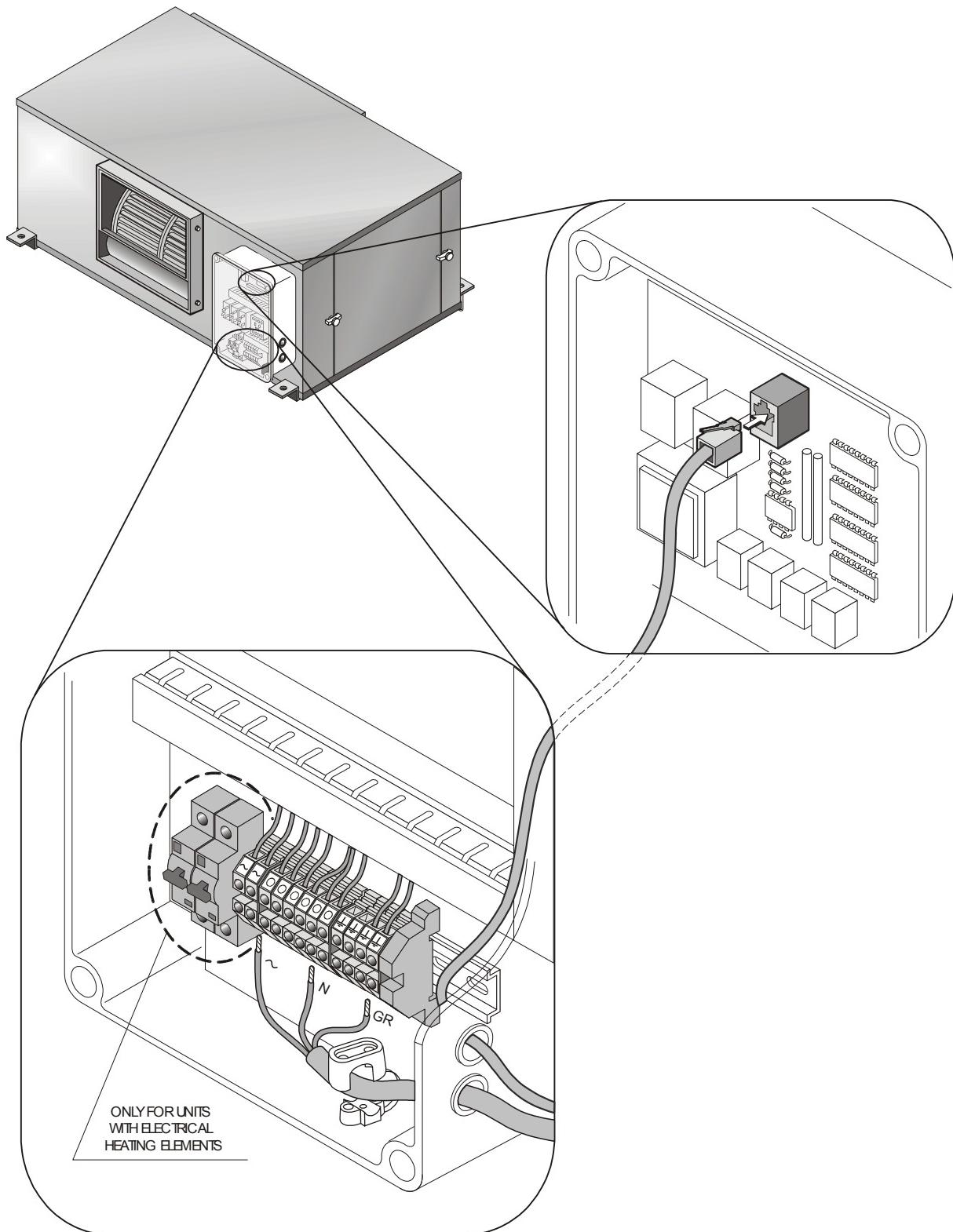
## 8. INSTALLING CONTROL SYSTEM and CONNECTING POWER

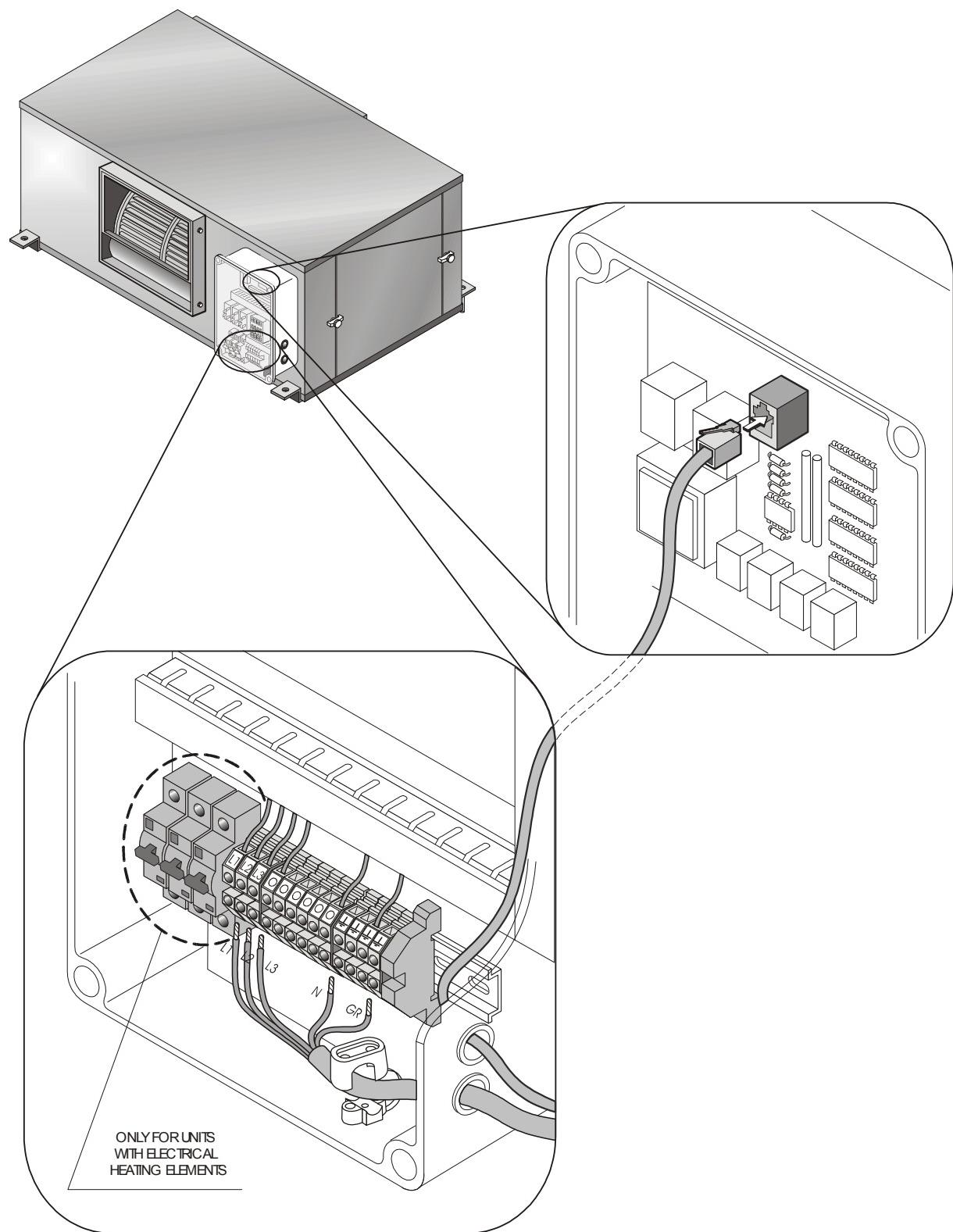
### 8.1 Installing the Thermostat (Fig. 8-1)



**Fig. 8-1**

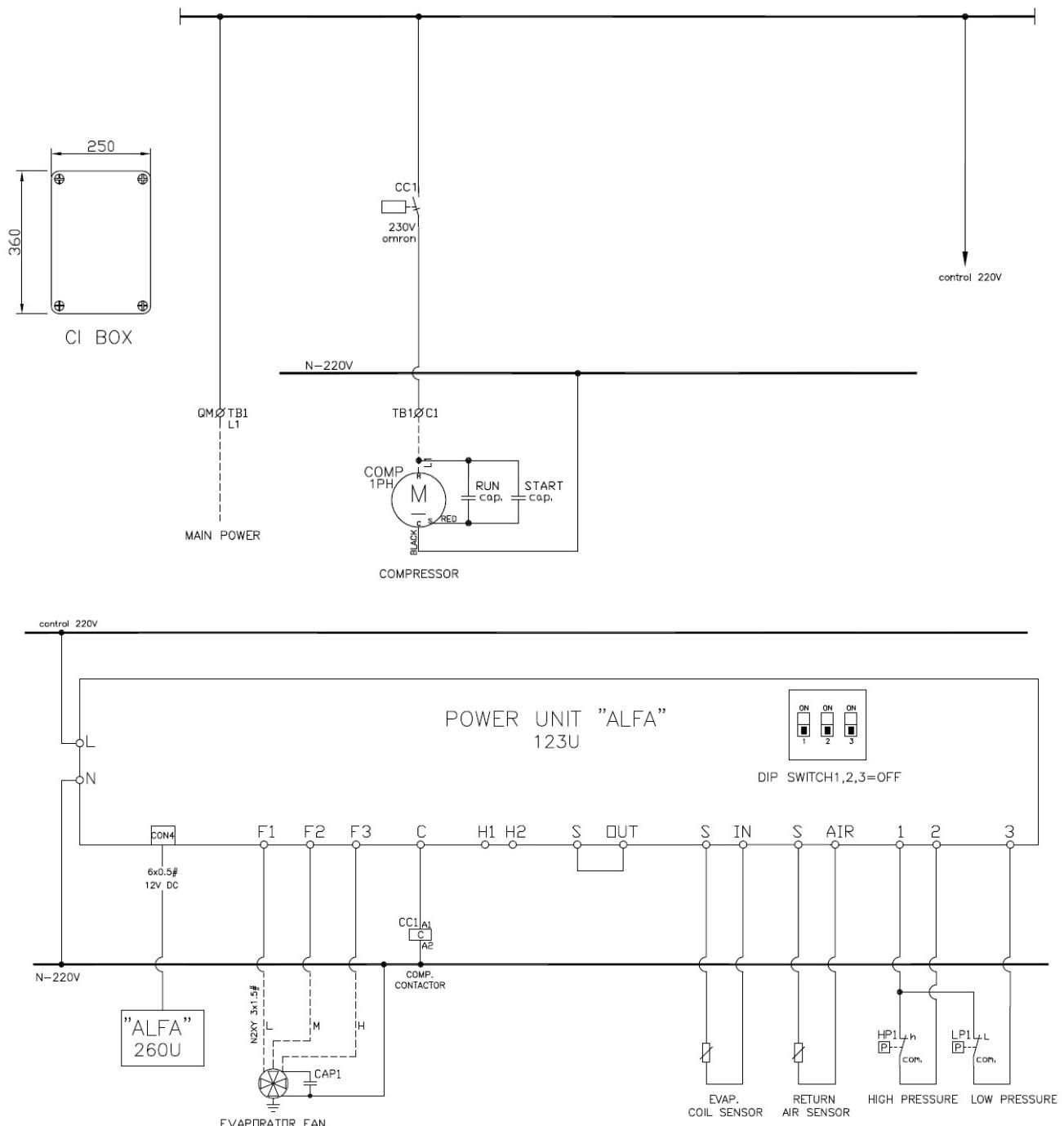
- Remove the thermostat from the packaging.
- Install the in-room wall mounted thermostat:
  - Separate the front panel from the back panel by depressing the tongue lock located in the back part of the unit.
  - Push the back panel out.
  - Gently disconnect the data cable from its quick connect wiring harness.
  - Line the back panel up against the wall or against any other flat surface onto which it is to be mounted. Drill holes and use appropriate fixing screws to fasten the panel to its location.
- Locate the terminal box. See Fig. 8-2 and Fig. 8-3.
- Complete the electrical connections according to the electrical wiring diagrams.
- Reconnect the data cable and close back the cover of the thermostat to its base.

**8.2 Terminal Box Location – Single Phase Unit****Fig. 8-2**

**8.3 Terminal Box Location – 3 Phase Unit****Fig. 8-3**

## 9. Electrical Wiring Diagrams

### 9.1 Electrical Wiring Diagram – Single Phase Cooling Only – Model 260U

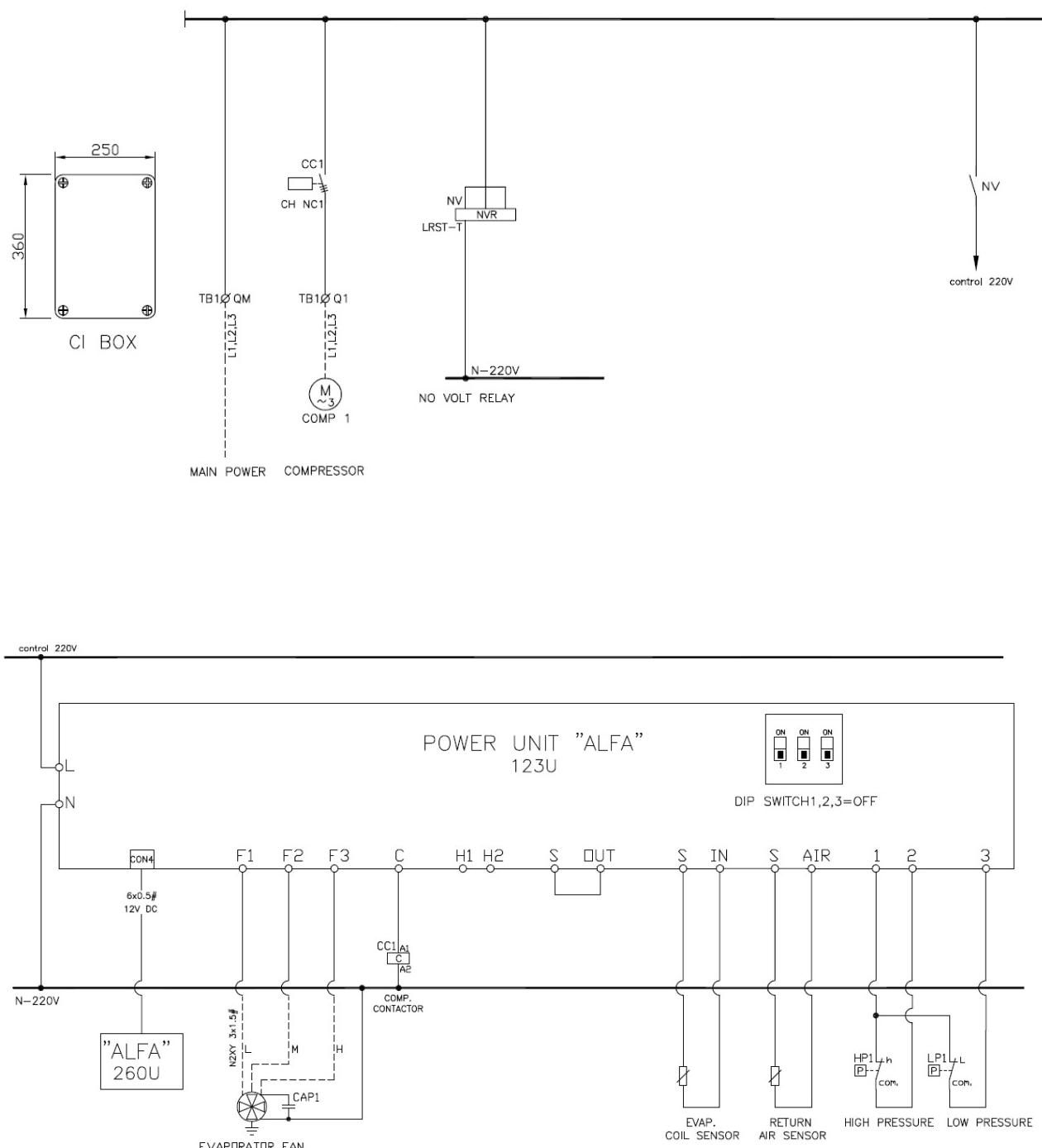


**HP** – High pressure control  
**LP** – Low pressure control  
**CC** – Compressor contactor

**ALFA 123U** – Power switch unit  
**ALFA 260U** – Room Thermostat

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm <sup>2</sup>	2.5	2.5	2.5	4	4	6	-	-	-	-	-	-	-	-

## 9.2 Electrical Wiring Diagram – 3 Phase Cooling Only – Model 260U

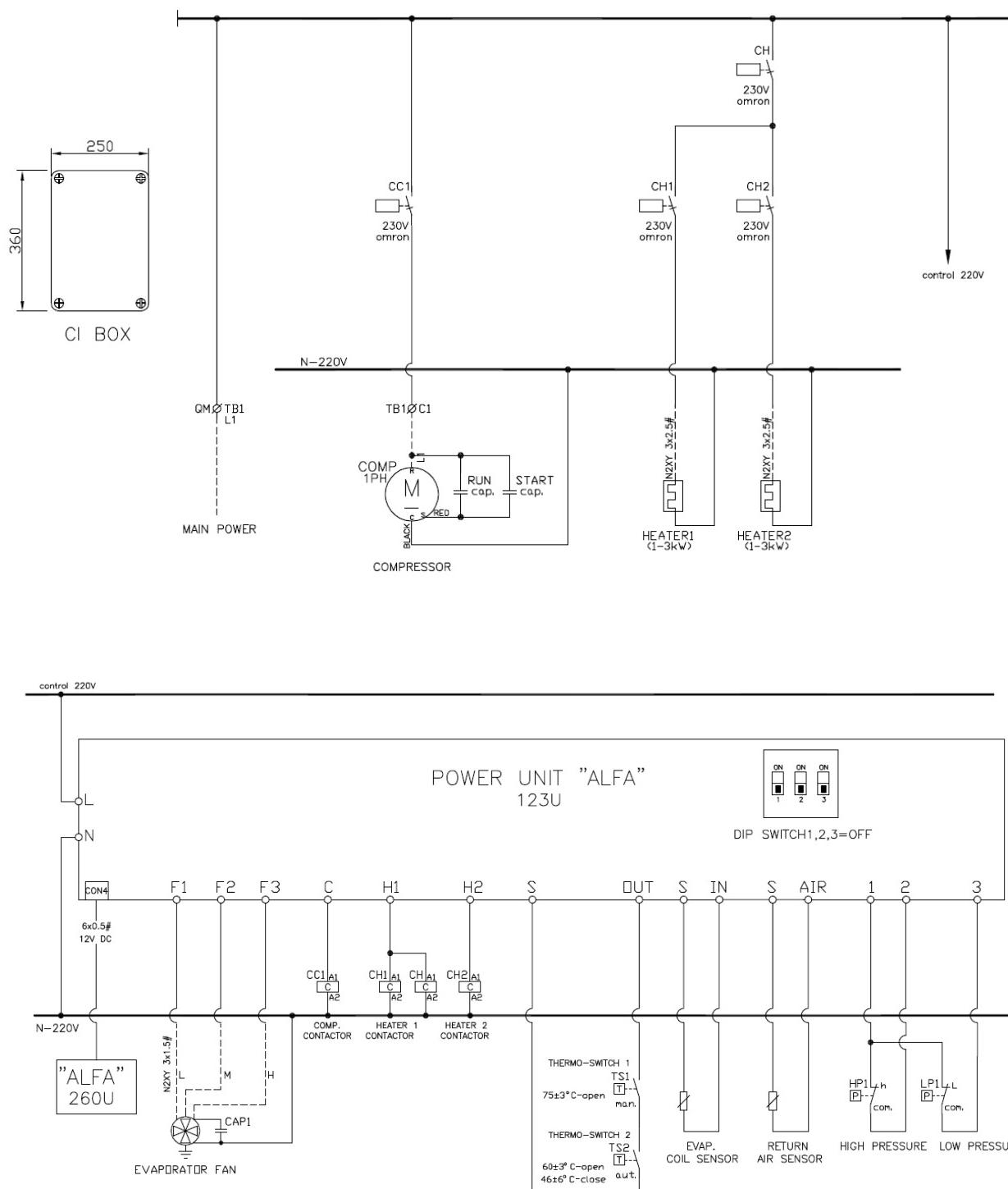


**HP** – High pressure control  
**LP** – Low pressure control  
**CC** – Compressor contactor

**ALFA 123U** – Power switch unit  
**ALFA 260U** – Room Thermostat

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm <sup>2</sup>	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4	4	6	10	10

### 9.3 Electrical Wiring Diagram – Single Phase with Electrical Heating Elements – Model 260U



**HP – High pressure control**

**LP – Low pressure control**

**ALFA 260U – Room Thermostat**

**ALFA 123U – Power switch unit**

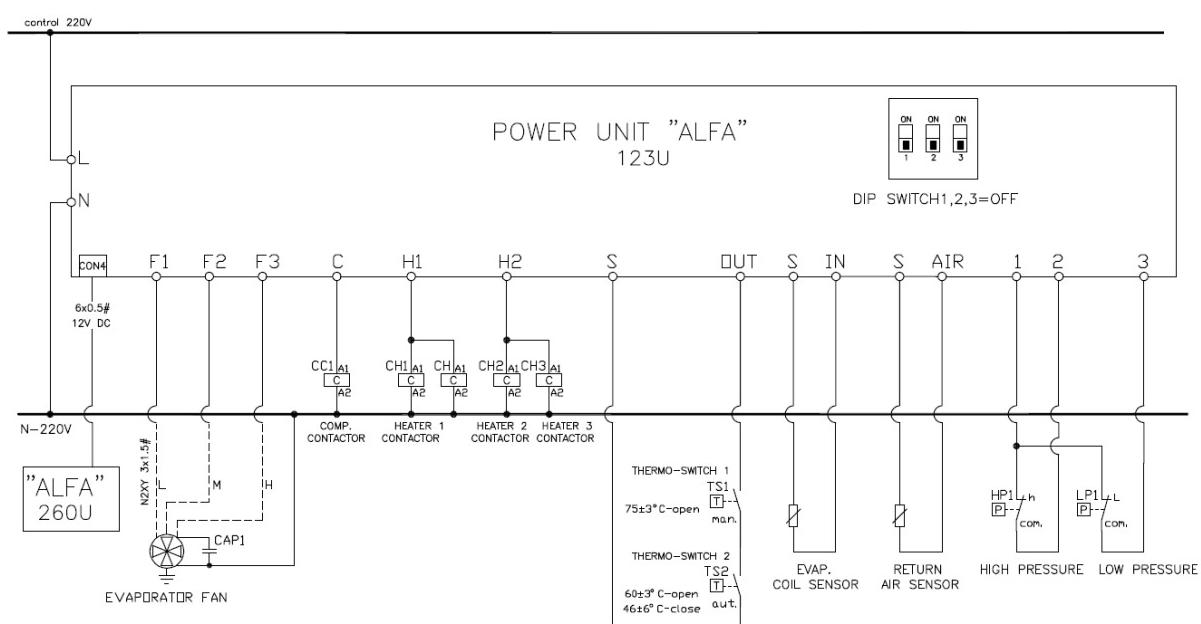
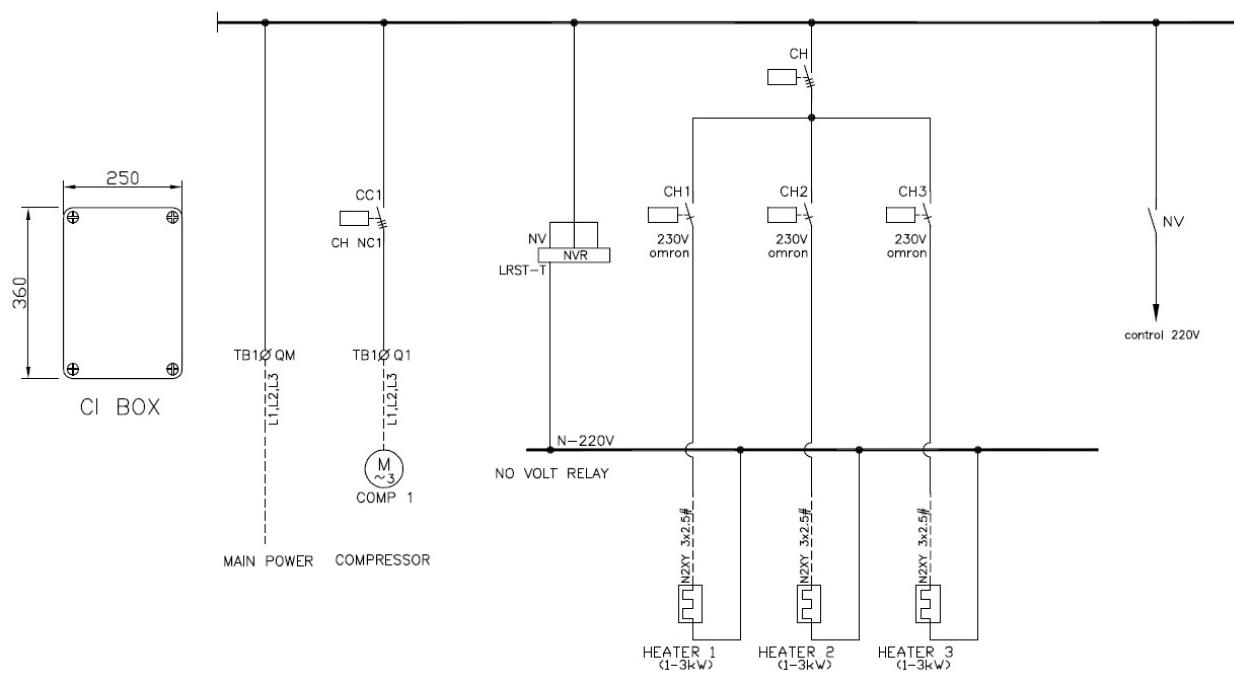
**CC – Compressor contactor**

**CH1, CH2 – Heaters contactor**

**TS1, TS2 – Safety thermostat**

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm <sup>2</sup>	2.5	2.5	2.5	4	4	6	-	-	-	-	-	-	-	-

#### 9.4 Electrical Wiring Diagram – 3 Phase with Electrical Heating Elements – Model 260U



**HP** – High pressure control

**LP** – Low pressure control

**ALFA 260U** – Room Thermostat

**ALFA 123U** – Power switch unit

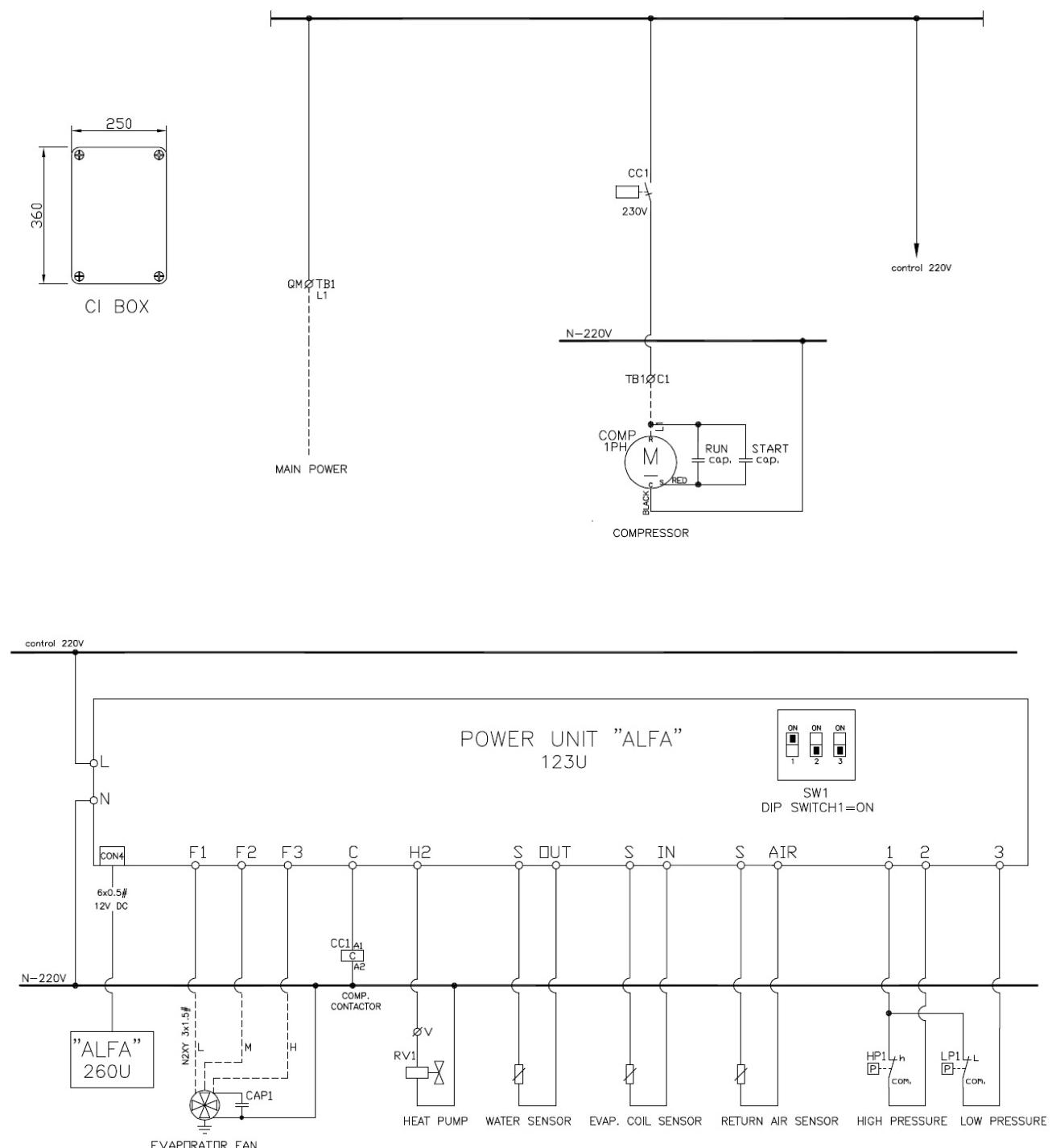
**CC** – Compressor contactor

**CH1, CH2** – Heaters contactor

**TS1, TS2** – Safety thermostat

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm <sup>2</sup>	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4	4	6	10	10

## 9.5 Electrical Wiring Diagram – Single Phase with Heat Pump – Model 260U

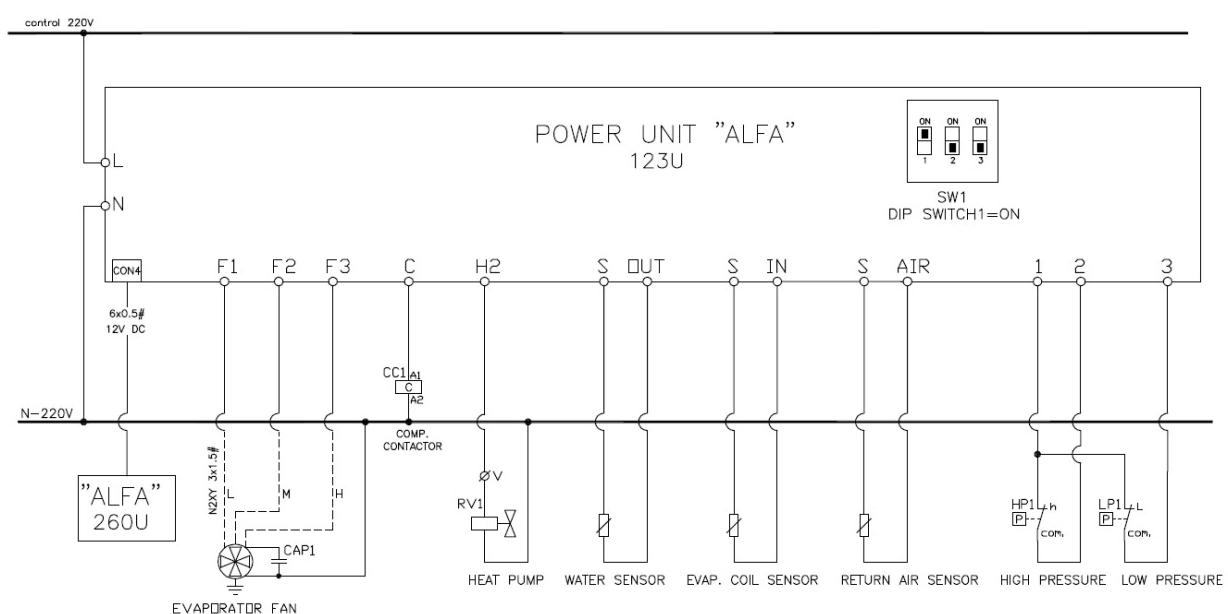
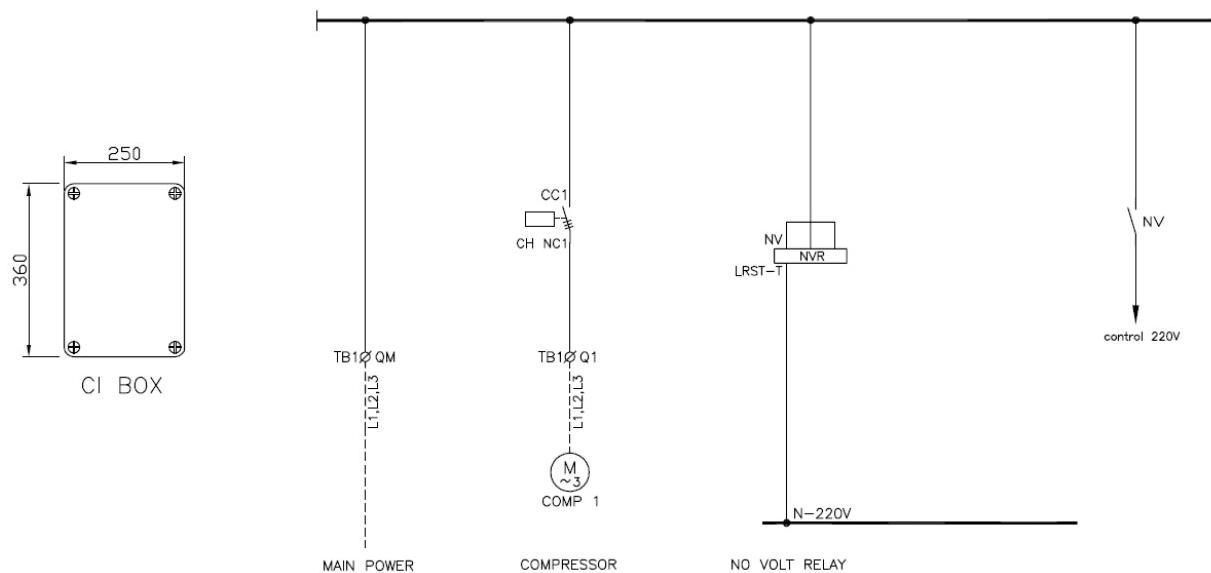


**HP** – High pressure control  
**LP** – Low pressure control  
**ALFA 260U** – Room Thermostat

**ALFA 123U** – Power switch unit  
**CC** – Compressor contactor  
**RV1** – 4 way valve

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm <sup>2</sup>	2.5	2.5	2.5	4	4	6	-	-	-	-	-	-	-	-

## 9.6 Electrical Wiring Diagram – 3 Phase With Heat Pump – Model 260U



**HP** – High pressure control

**LP** – Low pressure control

**ALFA 260U** – Room Thermostat

**ALFA 123U** – Power switch unit

**CC** – Compressor contactor

**RV1** – 4 way valve

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm <sup>2</sup>	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4	4	6	10	10

## 10. TROUBLESHOOTING GUIDE

### 10.1 Troubleshooting Notes.



**Important! Reset:** Once the unit has stopped due to failure, restart is possible after resetting. Reset the system by pressing ON/OFF button on the room thermostat. Call the technician for assistance should the failure be repeated.



**Note:** Check for broken wires and loose cable lugs first!



**Warning:** Always unplug the A/C before performing cleaning or maintenance activities.

### 10.2 Failure Code Troubleshooting.

	Display	Possible Cause	Corrective Action
1	<b>ER1</b>  Communication failure between display and power units.	Short, disconnected or faulty communication cable.	Check communication cable. Replace cable if faulty.
2	<b>ER2</b>  Room thermostat Sensor failure. Unit continues running.	Short, disconnected or faulty room thermostat air sensor.	Check return air sensor. Replace thermostat if faulty.
3	<b>ER3</b>  Evaporator coil sensor failure. Unit continues running.	Short, disconnected or faulty evaporator coil sensor.	Check evaporator coil sensor. Replace sensor if faulty.
4	<b>ER4</b>  <b>Only for Heat Pump</b>  Water temperature sensor failure  Unit continues running.	Short, disconnected or faulty water temperature sensor.	Check water temperature sensor. Replace sensor if faulty.

**Failure Code Troubleshooting (continued).**

	<b>Display</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
<b>5</b>	<b>ER5</b> Gas pressure too low	1. Clogged air filter 2. Faulty fan capacitor. 3. Faulty fan motor. 4. Air discharge shutters are too closed. 5. Lack of refrigerant. 6. Condenser cooling water is too cold.	1. Clean filter. 2. Replace capacitor. 3. Replace fan motor. 4. Open air discharge shutters. 5. Check for leaks and add refrigerant. 6. Check cooling tower (or the cooling water source) for proper operation.
<b>6</b>	<b>ER6</b> Gas pressure too high	1. Clogged water strainer. 2. Condenser cooling water too warm. 3. No water circulation in heat exchanger.	1. Clean strainer. 2. Check cooling tower (or the cooling water source) for proper operation. 3. a. Check cooling tower (or the cooling water source) for proper operation. b. Heat exchanger is clogged. Clean the heat exchanger or replace it.
<b>7</b>	<b>ER7</b> <b>Only for units with electrical heating elements.</b> Heating elements protection.	1. No air supply at indoor side. 2. Indoor fan is not running. 3. Air shutters are closed.	1. See troubleshooting guide section 10.3 item 4 2. See troubleshooting guide section 10.3 item 7 3. Open air shutters.
<b>8</b>	<b>ER8</b> <b>Only for Heat Pump</b> Water temperature too cold.	Lack of water or low water flow.	1. Check water filter.
<b>9</b>	<b>ER9</b> Return air sensor is short-circuited or disconnected.	Short, disconnected or faulty return air temperature sensor.	Check return air temperature sensor. Replace sensor if faulty.

### 10.3 General Troubleshooting.

	<b>Symptom</b>	<b>Probable Cause</b>	<b>Corrective Action</b>
<b>1</b>	A/C fails to start.	<ol style="list-style-type: none"> <li>1. Power supply to unit not connected (display is blank).</li> <li>2. Fuse Blown (display is blank).</li> <li>3. Electric supply wall socket is defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for proper connection of power plugs in wall socket. Check red LED on RST Controller (wherever applicable): If LED is OFF – change RST wires. If LED is ON – check Phase voltage.</li> <li>2. Reset automatic circuit breaker or replace line fuse.</li> <li>3. Repair or replace wall socket.</li> </ol>
<b>2</b>	Only indoor fan motor works although cooling or heating is desired.	<ol style="list-style-type: none"> <li>1. The selected mode is on Fan Only, or on Cool when heating is desired.</li> <li>2. Temperature is set to a value which is too high (in Cool mode).</li> <li>3. Faulty compressor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check if the room thermostat is on the desired mode. If not, select the correct mode (refer to your User Manual).</li> <li>2. Observe the temperature setting on the room thermostat.</li> <li>3. Replace compressor.</li> </ol>
<b>3</b>	Only fan motor is working. No cooling and/or heating take place.	<ol style="list-style-type: none"> <li>1. Overload safety device on compressor is cut out due to high temperature.</li> <li>2. Compressor run capacitor is burnt.</li> <li>3. Compressor winding shorted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Switch Off power and try again after one hour.</li> <li>2. Replace compressor run capacitor.</li> <li>3. Replace compressor.</li> </ol>
<b>4</b>	No air supply at indoor unit	<ol style="list-style-type: none"> <li>1. Indoor fan motor is blocked or turns slowly.</li> <li>2. Indoor fan motor capacitor is burnt.</li> <li>3. Indoor fan motor winding is burnt.</li> <li>4. Clogged air filters.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltage. Repair wiring if necessary. Check indoor fan wheel if tight on motor shaft. Tighten if necessary.</li> <li>2. Replace indoor fan motor capacitor.</li> <li>3. Replace indoor fan motor.</li> <li>4. Clean filters.</li> </ol>

**General Troubleshooting (continued).**

	<b>Symptom</b>	<b>Probable Cause</b>	<b>Corrective Action</b>
<b>5</b>	Low Capacity.	1. Lack of refrigerant causes ice formation on the evaporator coil (in Cool mode). 2. Clogged air filters.	1. Unit must be charged (according to the nameplate) after localizing the gas leak. 2. Clean filters.
<b>6</b>	Water accumulates and overflows from evaporator drain pan.	Drain pan pipe or hose is clogged or the spout of drain pan is clogged.	Disassemble plastic drain-pipe from spout of evaporator drain pan. Flush with clean water.
<b>7</b>	Indoor fan is not running at all.	1. Failure in motor capacitor. 2. No voltage out of P.C.B. assembly for fan motor. 3. Motor winding failure (check resistance).	1. Replace the capacitor. 2. Replace the P.C.B. assembly. 3. Replace the fan motor.
<b>8</b>	Compressor motor is not running at all	1. Failure in compressor motor magnetic contactor. 2. Compressor motor winding failure (check resistance).	1. Replace faulty contactor. 2. Replace the compressor.

## 10.4 Poor Cooling Troubleshooting.

	<b>Symptom</b>	<b>Probable Cause</b>	<b>Corrective Action</b>
<b>1</b>	Refrigerant flow failure	1. Refrigerant gas shortage. 2. Excessive overcharging of refrigerant. 3. Gas leakage. 4. Clogging of strainer or capillary tube. 5. 4-Way valve is defective. 6. Solenoid 4-Way valve is defective. 7. Compressor is defective.	1. Charge refrigerant gas. 2. Recharge gas. 3. Repair leakage. 4. Replace strainer. 5. Replace 4-Way valve. 6. Replace solenoid. 7. Replace compressor.
<b>2</b>	Air circulation failure.	1. Air filter is clogged 2. Air shutters are closed.	1. Clean air filter. 2. Open air discharge shutters.
<b>3</b>	Freezing Conditions at Evaporator Coil	1. Clogged air filter 2. Faulty capacitor. 3. Faulty fan motor. 4. Air discharge shutters are too closed. 5. Lack of refrigerant.	1. Clean filter. 2. Replace capacitor. 3. Replace fan motor. 4. Open air discharge shutters. 5. Check for leaks and add refrigerant.

## 10.5 Poor Heating Troubleshooting (Heat Pump).

	<b>Symptom</b>	<b>Probable Cause</b>	<b>Corrective Action</b>
<b>1</b>	Refrigerant flow failure	1. Refrigerant gas shortage. 2. Excessive overcharging of refrigerant. 3. Gas leakage. 4. Clogging of strainer or capillary tube. 5. 4-Way valve is defective. 6. Solenoid 4-Way valve is defective. 7. Compressor is defective.	1. Charge refrigerant gas. 2. Recharge gas. 3. Repair leakage. 4. Replace strainer. 5. Replace 4-Way valve. 6. Replace solenoid. 7. Replace compressor.
<b>2</b>	Air circulation failure.	1. Air filter is clogged 2. Air shutters are closed.	1. Clean air filter. 2. Open air discharge shutters.
<b>3</b>	Heating elements failure.	1. One or two heating stages are not operating.	1. a. Check electrical heating elements (resistance). b. Check contactors. c. Check the elements' time delay fuse.
<b>4</b>	Refrigerant low pressure.	1. Lack of water flow.	1. Check water filter.

## 11. CONTROL PROGRAMS and OPERATION INSTRUCTIONS

### 11.1 General

**Protection:** The air conditioner is protected by pressure and temperature sensors. The sensors cut off the unit once extreme and dangerous conditions are detected. The DISPLAY on the thermostat indicates the failure code as stipulated in the troubleshooting section.

**Restart after power failure:** Back-up memory keeps the working data. Once power returns, the air conditioner will restart and return to its saved data.

The unit can be modified to fail-safe manual restart after power failure (Start-Stop). Instructions for such modification are available upon request.

**Reset and restart after failure:** Once the unit has stopped due to failure, restart is possible after resetting. Reset the system by pressing ON/OFF button on the room thermostat. Call the technician for assistance should the failure be repeated.

**Restart time delay:** Compressor starting time delay is 1 min. at first start and 3.5 min. before each restarting. Timer accuracy is ±20 sec.

**Evaporator fan control (only for Heat Pump unit):** In cooling mode the fan runs continuously. In heating mode the fan stops running 15 sec. after compressor stop.

**Evaporator fan control (only for units with electrical heating elements):** In cooling mode the fan runs continuously. In heating mode the fan stops running 40 sec. after the heating elements are turned off.

**Water temperature control (only for Heat Pump unit):** Compressor stops if water temperature reaches below 4°C. Compressor restart enabled at water temperature above 10°C. Failure in water temperature sensor does not stop unit operation. If failure occurs 3 times per hour and/or holds for 1 full hour, signal of failure **ER8** will appear stable and On/Off press for re-start not allowed. Re-start only by shut-off and switch-on of power supply.

**Heating control (only for units with electrical heating elements):** The return air temperature sensor switches ON the first heating group at room temperature 1°C lower than the set temperature. Heating is switched OFF at set point.

Second heating group is switched ON at room temperature 2°C lower than the set temperature. Second heating group is switched OFF at 1°C under set point.

**Evaporator coil temperature control:** Compressor stops at coil temperature below 0°C. Compressor restart enabled at coil temperature above 8°C.  
Failure in evaporator coil temperature sensor does not stop unit operation.

**Return air temperature sensor:** Thermostats include an incorporated, build-in temperature sensing element. However, an external sensor (optional) can be added. In such case the operation of the unit is governed by the selected sensor.

The thermostat temperature setting range is 16°C to 30°C.

Failure in return air sensor will cause the compressor to run continuously. If unit was set to "AUTO" operation mode, the compressor will not run.

**Air-Flow protection (only for units with electrical heating elements):** To protect the heating elements from overheating or from operating without flowing air.

A combination of differential pressure flow-switch (for heating elements larger than 12KW) and temperature sensor immediately cut off the heating elements in case the temperature or air-flow reaches the pre-set protection values. The fan continues running for additional 15 sec.

**Low pressure protection:** Low pressure compressor protection. At each compressor restart, the system ignores L.P entrance!! For 2 minutes. **Cooling mode:** At low pressure failure of 5 seconds long - shuts compressor. After compressor delay (3 minutes) if L.P closed the unite returns to normal operation. If L.P still open, re-start the compressor and activates the fan in high speed. After 1 minute, if L.P still open, the system shuts down and the displays show "ER5" flashing. **Heating mode:** The fan operates in LOW speed for 5 minutes and then change to desire speed. At low pressure failure of 5 seconds long - shuts compressor. After compressor delay (3 minutes) If L.P still open, re-start the compressor and activates the fan in desire speed. After 1 minute if L.P still open the compressor stops. Fan stop after 20 seconds and the displays show "ER5" flashing.

**High pressure protection:** High pressure compressor protection. **Cooling mode:** At H.P failure, stop compressor after 1 second. After compressor delay (3 minutes) the unite returns to normal operation. If failure occurs 3 times in 15 minutes, the system shut down. Signal "ER6" appears flashing. **Heating mode:** The fan operates in LOW speed for 5 minutes and then change to desire speed. If the fan operate in LOW or MEDIUM speed and H.P failure occurs, the speed switch to HIGH. When fan speed is HIGH and H.P contact open for 1 second, the compressor stop. After compressors delay (3 minutes) the unit re starts the compressor. If failure occurs 3 times in 15 minutes, the system shut down. Signal "ER6" appears flashing.

## **11.2 Modes of operation and uses**

### **Setting the Temperature**

The temperature may be adjusted within the range of 16°C and 30°C. Use temperature setting pushbuttons (+) to increase and (-) decrease the temperature.

### **Cooling Mode**

In this mode the air conditioner cools, dries and filters the air in the room. The set temperature is maintained.

### **Heating Mode**

In this mode the air conditioner heats and filters the air in the room. The set temperature is maintained.

### **Auto Cooling/Heating Mode**

In this mode the air conditioner automatically selects the cooling or heating position according to room conditions and set temperature.

### **Auto Ventilation Mode**

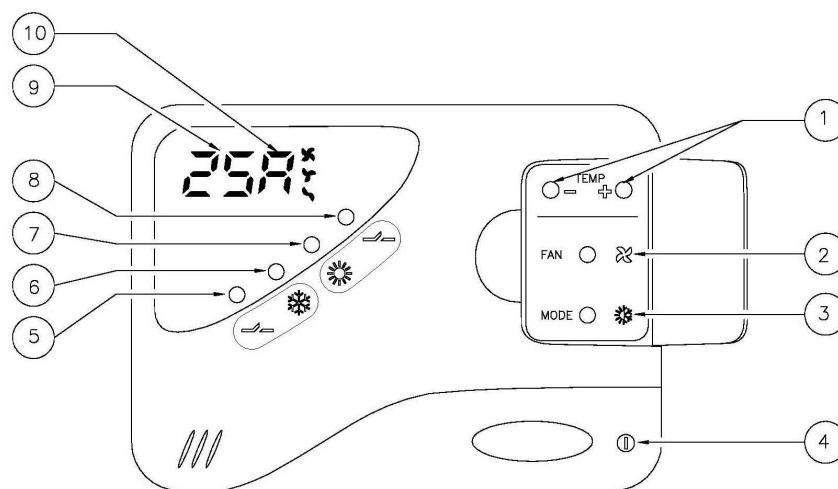
In this mode the air conditioner automatically changes the speed of the fan in accordance with the room temperature. At room temperature close to the set point the fan rotates at low speed while speed increases when room temperature is up.

Display shows "A"

### **Fan Only (Ventilation) Mode**

The air conditioner maintains continuous air flow, without cooling or heating. Display shows "F".

### 11.3 Wall Mounted Thermostats α 260U



- 1. Temp** Temperature setting pushbuttons: (+) temp rise, (-) temp drop.  
(Continuous press on 2 buttons simultaneously will display momentarily real temp – flashing).  
Continuous press on 2 buttons simultaneously for 2 seconds, display real temp continuously
- 2. Fan** Fan speed select pushbutton. Available speeds are Slow, Medium, High and Auto.
- 3. Mode** Selection pushbutton for mode of operation. Available modes are Cooling, Heating, Auto and Fan.
- 4. On/Off** Pushbutton for turning the unit on and off. This pushbutton is also used for failure canceling.
- 5. "Active Cool" LED** Cooling operation indicator LED.  
LED ON indicates that the unit is cooling.  
LED Blinking indicates delayed cooling action.  
LED OFF indicates no cooling demand.
- 6. Cooling LED** This LED is ON in cooling and in Auto modes. In the rest of the modes the LED is OFF.
- 7. Heating LED** This LED is ON in heating and in Auto modes. In the rest of the modes the LED is OFF.
- 8. "Active Heat" LED** Heating operation indicator LED.  
LED ON indicates that the unit is heating.  
LED Blinking indicates delayed heating action.  
LED OFF indicates no heating demand.
- 9. Display-Temp.** The first two digits display the set temperature.  
Simultaneous pressing of both (+) and (-) buttons will display the actual room temperature.
- 10. Display-Fan Pos.** Display of fan position.
- |          |              |          |                  |
|----------|--------------|----------|------------------|
| <b>A</b> | Fan in Auto  | <b>F</b> | Unit in FAN mode |
|          | High Speed   |          |                  |
|          | Medium Speed |          |                  |
|          | Low Speed    |          |                  |

## *NOTES*



**Unique – Engineering & Air Conditioning  
Mitzpe Sapir Industrial Park  
P.O.B. 13201 Tsur Igal 44862, ISRAEL  
Tel. 972-9-7498707, Fax. 972-9-7498708  
E-mail: unique@unique-eng.co.il**